Agates

Arizona Historical Society

Evolution of Inclusions

Pre-banding of inclusions form prior to the banding of silica gels. Syn-banding inclusions form simultaneously without banding of silica gels. Post-banding inclusions form after the banding of the silica gels.

Silica gel source-

Ash flow/Air-fall tuff + devitrification + water = siliceous gel + clay + zeolites

Introduction

Moss Agate

Membranous cristobalites often take the form of a network of interweaving tubes

Needles/Tubes

Needles of goethite (rarely rutile) form in the gas vesicles as a pre-banding inclusion. Silica gels form around the needles creating “tubes.” A tube agate is a simple shape having nothing to do with an eye agate (see example).

Needles/Tubes

Fire Agates

Polka Dot

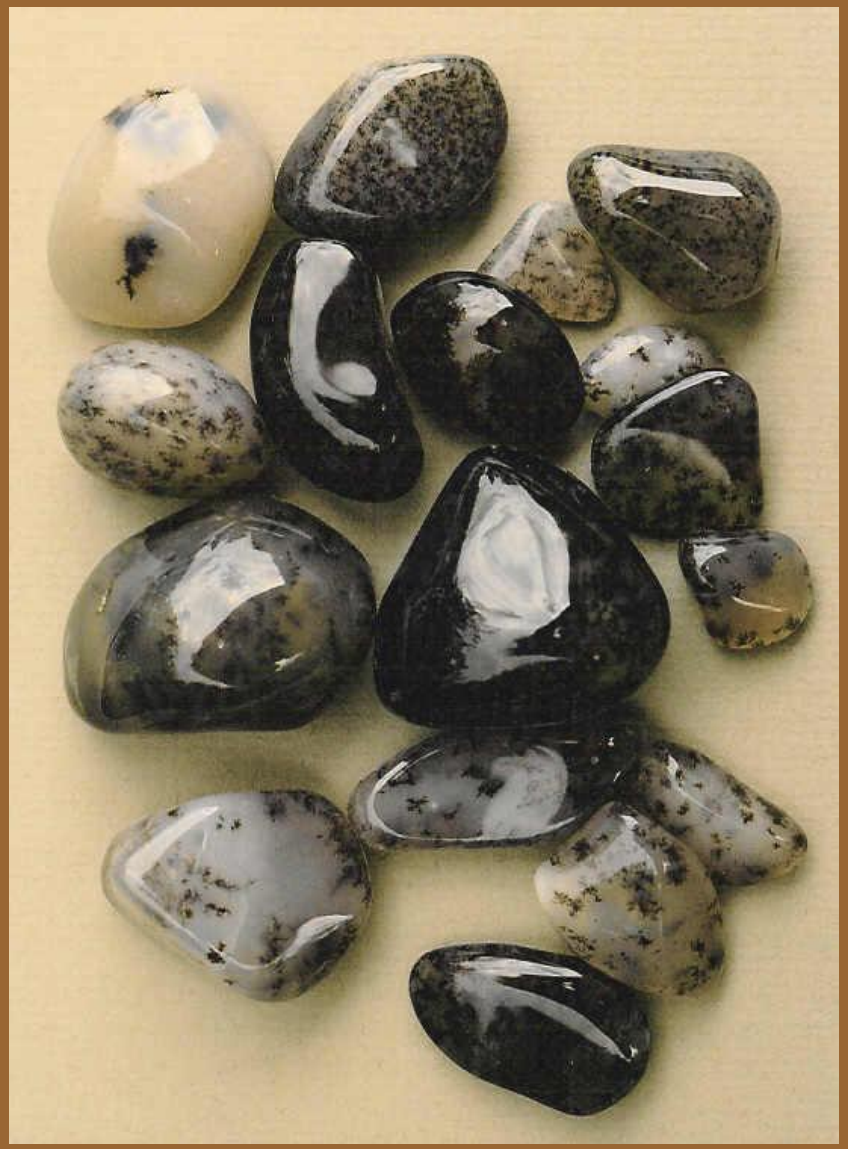
- Pisolites are pea-shaped inclusions that formed when water that contains dissolved minerals is flushed through empty gas vesicles. The dissolved minerals were probably or iron carbonates or oxides.

Eye Agates

The “eye” is composed of concentrically arranged bands that form a hemisphere. Eye Agates are most found as amygdaloidal agates.

Dendritic Agate

Dendrites appear like tree branches. These inclusions are usually composed of manganese or iron oxides.

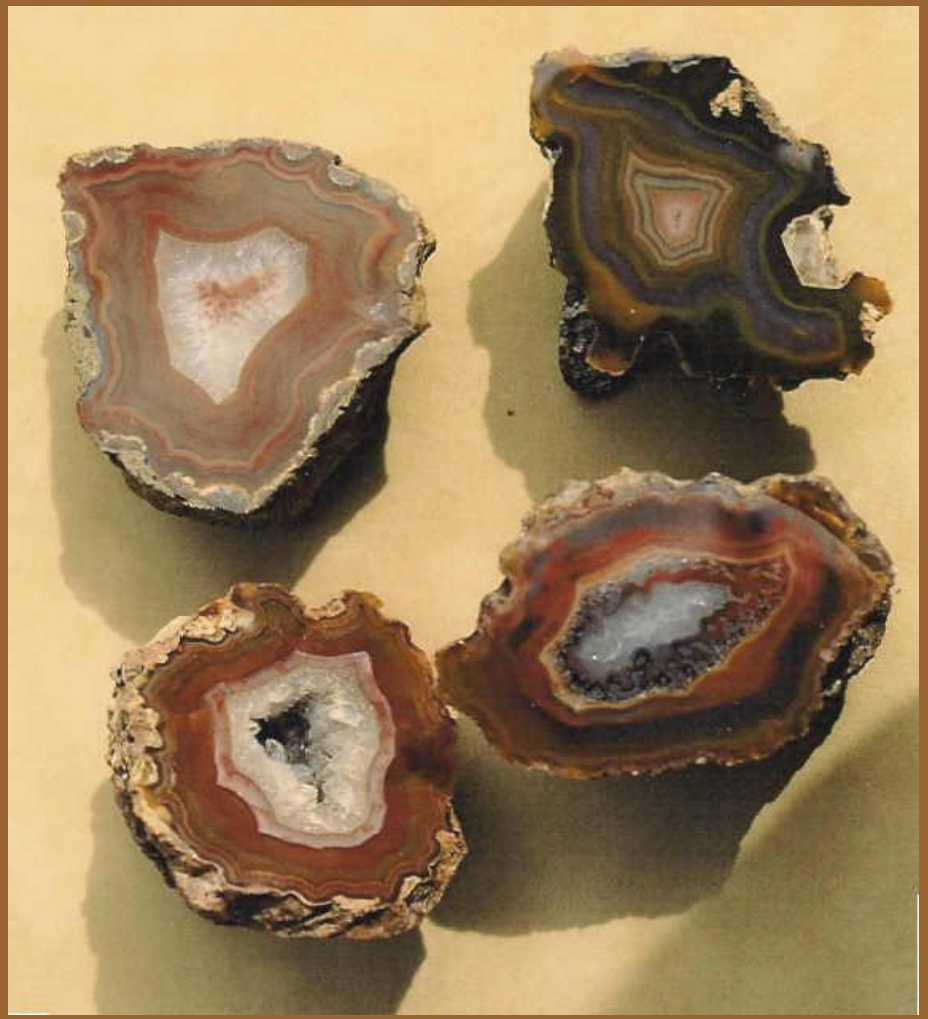


Fortification Agates

Heat builds up as the band forming process concludes in fortification agates. Enough heat can be generated to reach the boiling point of water. When this happens, bubbles can be seen in the escape tube of the agate.

Chromatagraphs

Chromatographs (intense banding colors) occur when mixed dyes are separated by a porous membrane.

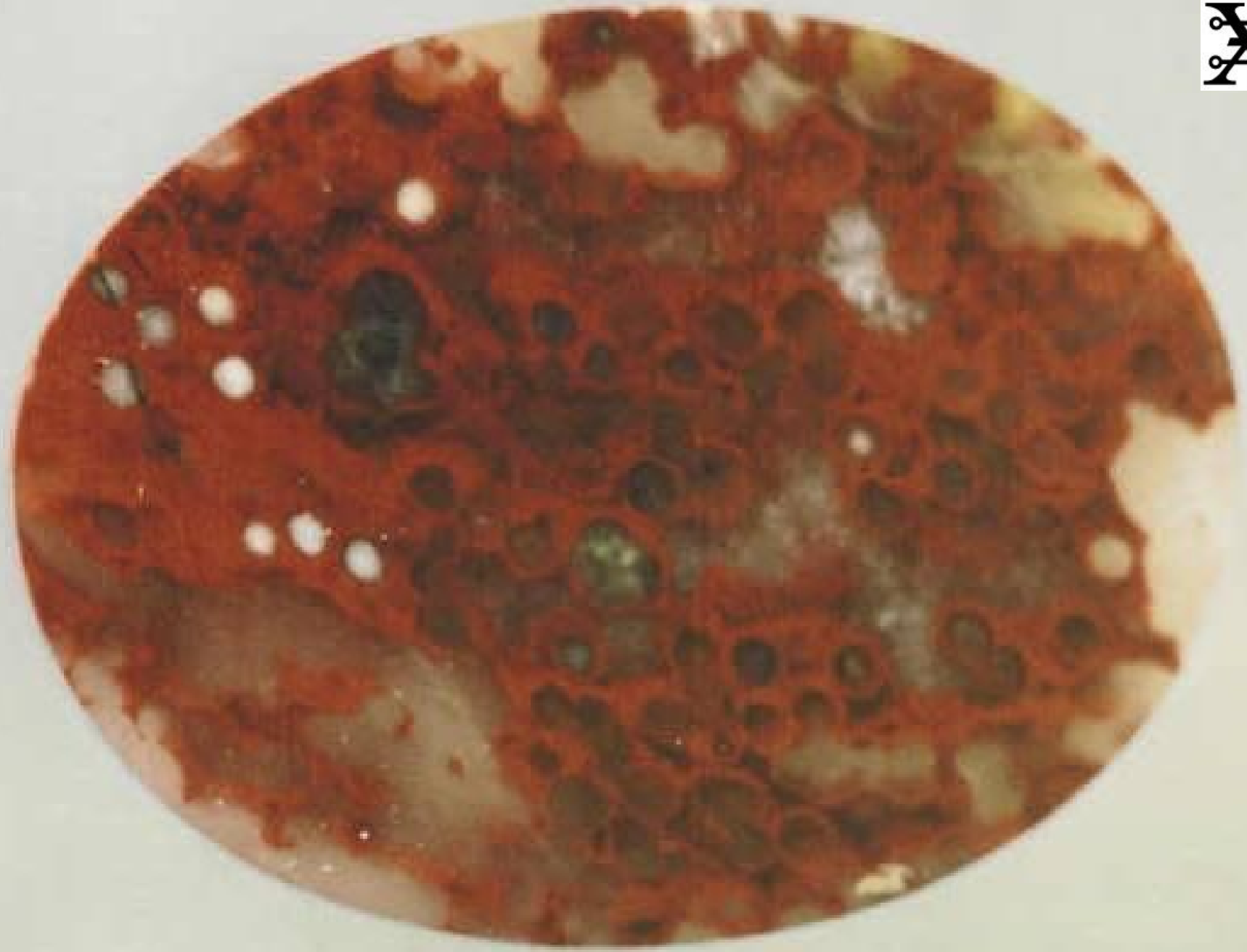


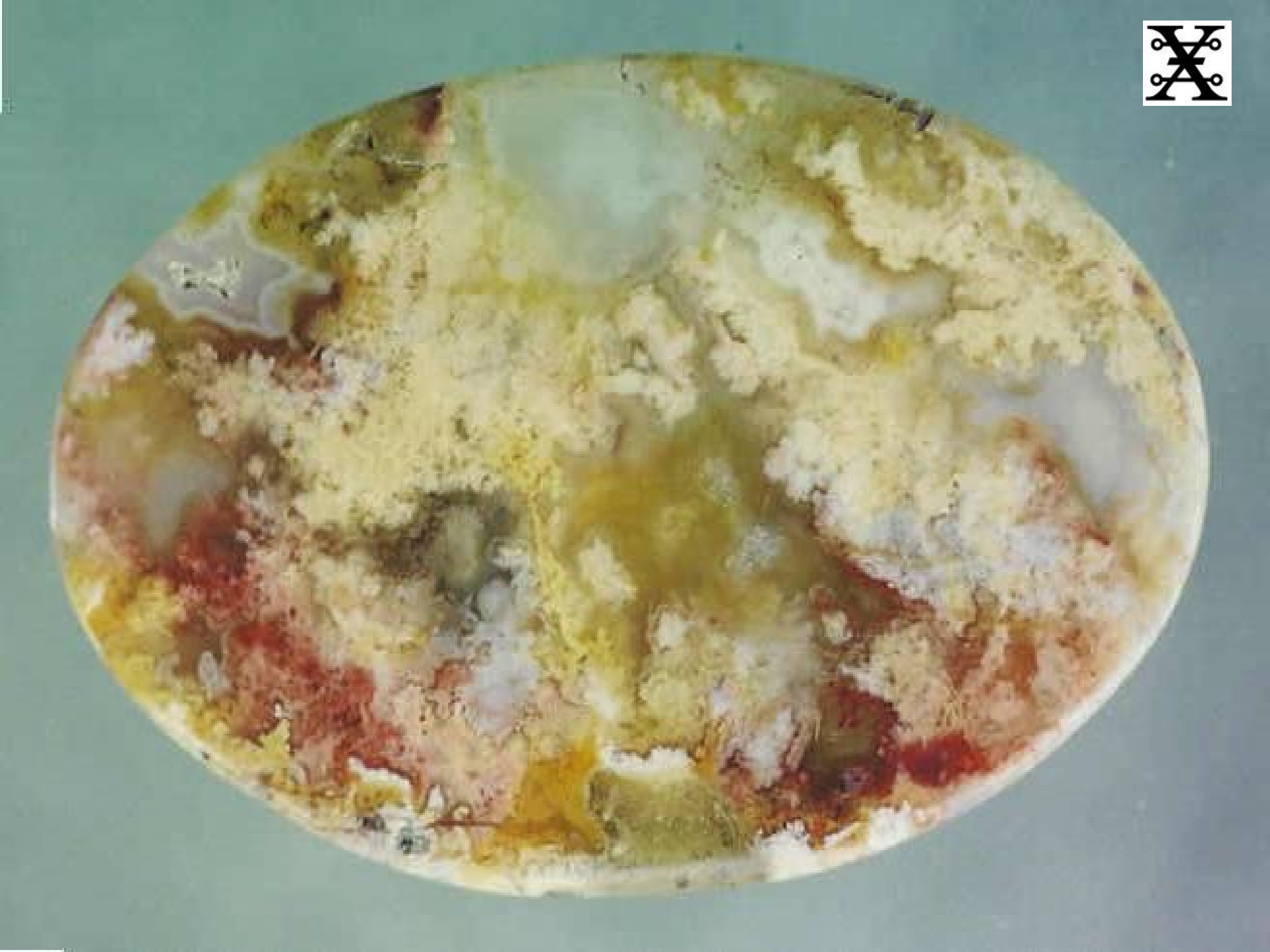
Banded Agates

The flow structures on banded agates may be oriented in different directions showing deformation of bands and indicating that the agate was in a gelatinous state for some time after the bands had formed.

Plume Agates

Frequently, plume agates are composed of iron oxides which may be hematite, limonite or goethite.





Stalk Aggregates

Stalk Aggregates form when material of a low intensity , such as water droplets or dust rises upward through material of a higher density (e.g. *silica gel*).

Pseudomorph Inclusions

Some agates show evidence of crystals that existed prior to the silica-gels' replacement. Crystals of aragonite, anhydrite or calcite probably result from alkaline lakes.

Flame Agates